**Docket No.: UPAP0002-100**
**PATENT**

**Serial Number: 09/359,975**
**Filed: July 23, 1999**

**In the Claims:**

Please amend claims 58, 59, 63, 64, and 122-125 as follows:

**1-57. (canceled)**

**58. (Currently Amended)** A ~~pharmaceutical~~ composition comprising:

a) a polynucleotide function enhancer; and

b) A DNA molecule that comprises a DNA sequence that encodes an antigen from an intracellular pathogen; wherein

i) said polynucleotide function enhancer is a compound having one of the following formulas:

$$Ar - R^1 - O - R^2 - R^3$$

or

$$Ar - N - R^1 - R^2 - R^3$$

or

$$R^4 - N - R^5 - R^6$$

or

$$R^4 - O - R^1 - R^7$$

wherein:

Ar is benzene, *p*-aminobenzene, *m*-aminobenzene, *o*-aminobenzene, substituted benzene, substituted *p*-aminobenzene, substituted *m*-aminobenzene, substituted *o*-aminobenzene, wherein the amino group in the aminobenzene compounds can be amino, $C_1 - C_5$ alkylamine, $C_1$-$C_5$, $C_1$-$C_5$ dialkylamine and substitutions in substituted compounds are halogen, $C_1$-$C_5$ alkyl and $C_1$-$C_5$ alkoxy;

$R^1$ is C=O;

$R^2$ is $C_1$-$C_{10}$ alkyl including branched alkyls;

$R^3$ is hydrogen, amine, $C_1$-$C_5$ alkylamine, $C_1$-$C_5$, $C_1$-$C_5$ dialkylamine;

$R^2 + R^3$ can form a cyclic alkyl, a $C_1$-$C_{10}$ alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a $C_1$-$C_{10}$ alkyl substituted cyclic aliphatic amine, a heterocycle, a $C_1$-$C_{10}$ alkyl substituted heterocycle including a $C_1$-$C_{10}$ alkyl N-substituted heterocycle;

$R^4$ is Ar, $R^2$ or $C_1$-$C_5$ alkoxy,a cyclic alkyl, a $C_1$-$C_{10}$ alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a $C_1$-$C_{10}$ alkyl substituted cyclic aliphatic amine, a heterocycle, a $C_1$-$C_{10}$ alkyl substituted heterocycle and a $C_1$-$C_{10}$ alkoxy substituted heterocycle including a $C_1$-$C_{10}$ alkyl N-substituted heterocycle;

$R^5$ is C=NH;

$R^6$ is Ar, $R^2$ or $C_1$-$C_5$ alkoxy, a cyclic alkyl, a $C_1$-$C_{10}$ alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a $C_1$-$C_{10}$ alkyl substituted cyclic aliphatic amine, a heterocycle, a $C_1$-$C_{10}$ alkyl substituted heterocycle and a $C_1$-$C_{10}$ alkoxy substituted heterocycle including a $C_1$-$C_{10}$ alkyl N-substituted heterocycle; and,

$R^7$ is Ar, $R^2$ or $C_1$-$C_5$ alkoxy, a cyclic alkyl, a $C_1$-$C_{10}$ alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a $C_1$-$C_{10}$ alkyl substituted cyclic aliphatic amine, a heterocycle, a $C_1$-$C_{10}$ alkyl substituted heterocycle and a $C_1$-$C_{10}$ alkoxy substituted heterocycle including a $C_1$-$C_{10}$ alkyl N-substituted heterocycle; and,

ii) said DNA sequence operatively linked to regulatory sequences which control the expression of said DNA sequence.

**59. (Currently Amended)** The ~~pharmaceutical~~ composition of claim 58 wherein said DNA molecule is a plasmid.

**60-62. (canceled)**

**63. (Currently Amended)** The ~~pharmaceutical~~ composition of claim 58 wherein said antigen is a viral antigen.

**64. (Currently Amended)** The ~~pharmaceutical~~ composition of claim 63 wherein said pathogen is a virus selected from the group consisting of: human immunodeficiency virus, HIV; Human T cell leukemia virus, HTLV; influenza virus; hepatitis A virus; hepatitis B virus; hepatitis C virus; human papilloma virus, HPV; Herpes simplex 1 virus, HSV1; Herpes simplex 2 virus, HSV2; Cytomegalovirus, CMV; Epstein-Barr virus, EBR; rhinovirus; and, coronavirus.

**65-114. (canceled)**

**115. (previously presented)** A method of introducing DNA molecules into cells of an individual comprising the steps of:

injecting into tissue of said individual at a site on said individual's body, DNA molecules and a polynucleotide function enhancer; wherein

i) said polynucleotide function enhancer is a compound having one of the following formulas:

$$Ar - R^1 - O - R^2 - R^3$$

or

$$Ar - N - R^1 - R^2 - R^3$$

or

$$R^4 - N - R^5 - R^6$$

or

$$R^4 - O - R^1 - R^7$$

wherein:

Ar is benzene, *p*-aminobenzene, *m*-aminobenzene, *o*-aminobenzene, substituted benzene, substituted *p*-aminobenzene, substituted *m*-aminobenzene, substituted *o*-aminobenzene, wherein the amino group in the aminobenzene compounds can be amino, $C_1 - C_5$ alkylamine, $C_1$-$C_5$, $C_1$-$C_5$ dialkylamine and substitutions in substituted compounds are halogen, $C_1$-$C_5$ alkyl and $C_1$-$C_5$

alkoxy;

$R^1$ is C=O;

$R^2$ is $C_1$-$C_{10}$ alkyl including branched alkyls;

$R^3$ is hydrogen, amine, $C_1$-$C_5$ alkylamine, $C_1$-$C_5$, $C_1$-$C_5$ dialkylamine;

$R^2 + R^3$ can form a cyclic alkyl, a $C_1$-$C_{10}$ alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a $C_1$-$C_{10}$ alkyl substituted cyclic aliphatic amine, a heterocycle, a $C_1$-$C_{10}$ alkyl substituted heterocycle including a $C_1$-$C_{10}$ alkyl N-substituted heterocycle;

$R^4$ is Ar, $R^2$ or $C_1$-$C_5$ alkoxy,a cyclic alkyl, a $C_1$-$C_{10}$ alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a $C_1$-$C_{10}$ alkyl substituted cyclic aliphatic amine, a heterocycle, a $C_1$-$C_{10}$ alkyl substituted heterocycle and a $C_1$-$C_{10}$ alkoxy substituted heterocycle including a $C_1$-$C_{10}$ alkyl N-substituted heterocycle;

$R^5$ is C=NH;

$R^6$ is Ar, $R^2$ or $C_1$-$C_5$ alkoxy, a cyclic alkyl, a $C_1$-$C_{10}$ alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a $C_1$-$C_{10}$ alkyl substituted cyclic aliphatic amine, a heterocycle, a $C_1$-$C_{10}$ alkyl substituted heterocycle and a $C_1$-$C_{10}$ alkoxy substituted heterocycle including a $C_1$-$C_{10}$ alkyl N-substituted heterocycle; and,

$R^7$ is Ar, $R^2$ or $C_1$-$C_5$ alkoxy, a cyclic alkyl, a $C_1$-$C_{10}$ alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a $C_1$-$C_{10}$ alkyl substituted cyclic aliphatic amine, a heterocycle, a $C_1$-$C_{10}$ alkyl substituted heterocycle and a $C_1$-$C_{10}$ alkoxy substituted heterocycle including a $C_1$-$C_{10}$ alkyl N-substituted heterocycle; and,

ii) said DNA molecules are taken up by cells in said tissue.

**116. (previously presented)** The method of claim 115 wherein said DNA molecule comprises a DNA sequence that encodes a protein, said DNA sequence operatively linked to regulatory sequences which control the expression of said DNA sequence.

**117. (previously presented)** The method of claim 115 wherein said DNA molecule is a plasmid.

**118. (previously presented)** The method of claim 115 wherein said tissue includes skin and muscle.

**119. (previously presented)** The method of claim 115 wherein said tissue is skin.

**120. (previously presented)** The method of claim 115 wherein said tissue is muscle.

**121. (previously presented)** The method of claim 120 wherein said tissue is skeletal muscle.

**122. (Currently Amended)** A ~~pharmaceutical~~ composition according to claim 58, wherein said polynucleotide function enhancer is a compound having the formula $Ar-R^1-O-R^2-R^3$.

**123. (Currently Amended)** The ~~pharmaceutical~~ composition of claim 122 wherein said DNA molecule is a plasmid.

**124. (Currently Amended)** The ~~pharmaceutical~~ composition of claim 122 wherein said antigen is a viral antigen.

**125. (previously presented)** The ~~pharmaceutical~~ composition of claim 124 wherein said pathogen is a virus selected from the group consisting of : human immunodeficiency virus, HIV; Human T cell leukemia virus, HTLV; influenza virus; hepatitis A virus; hepatitis B virus; hepatitis C virus; human papilloma virus, HPV; Herpes simplex 1 virus, HSV1; Herpes simplex 2 virus, HSV2; Cytomegalovirus, CMV; Epstein-Barr virus, EBR; rhinovirus; and, coronavirus.

**126-140 (canceled)**

**141. (previously presented)** A method of introducing DNA molecules into cells of an individual according to claim 115, wherein said polynucleotide function enhancer is a compound having the formula $Ar-R^1-O-R^2-R^3$.

**142. (previously presented)** The method of claim 141 wherein said DNA molecule comprises a DNA sequence that encodes a protein, said DNA sequence being operatively linked to regulatory sequences which control the expression of said DNA sequence.

**143. (previously presented)** The method of claim 141 wherein said DNA molecule is a plasmid.

**144. (previously presented)** The method of claim 141 wherein said tissue includes skin and muscle.

**145. (previously presented)** The method of claim 141 wherein said tissue is skin.

**146. (previously presented)** The method of claim 141 wherein said tissue is muscle.

**147. (previously presented)** The method of claim 146 wherein said tissue is skeletal muscle.

**148. (previously presented)** A method of inducing antibodies against an antigen in an individual comprising the steps of:

injecting into tissue of said individual at a site on said individual's body, a DNA molecule and a polynucleotide function enhancer,

said DNA molecule comprising a DNA sequence that encodes an antigen, said DNA sequence operatively linked to regulatory sequences which control the expression of said DNA sequence,

said polynucleotide function enhancer is a compound having one of the following formula:

$$Ar - R^1 - O - R^2 - R^3$$

or

$$Ar - N - R^1 - R^2 - R^3$$

or

$$R^4 - N - R^5 - R^6$$

or

$$R^4 - O - R^1 - R^7$$

wherein:

Ar is benzene, *p*-aminobenzene, *m*-aminobenzene, *o*-aminobenzene, substituted benzene, substituted *p*-aminobenzene, substituted *m*-aminobenzene, substituted *o*-aminobenzene, wherein the amino group in the aminobenzene compounds can be amino, $C_1 - C_5$ alkylamine, $C_1$-$C_5$, $C_1$-$C_5$ dialkylamine and substitutions in substituted compounds are halogen, $C_1$-$C_5$ alkyl and $C_1$-$C_5$
alkoxy;

$R^1$ is C=O;

$R^2$ is $C_1$-$C_{10}$ alkyl including branched alkyls;

$R^3$ is hydrogen, amine, $C_1$-$C_5$ alkylamine, $C_1$-$C_5$, $C_1$-$C_5$ dialkylamine;

$R^2 + R^3$ can form a cyclic alkyl, a $C_1$-$C_{10}$ alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a $C_1$-$C_{10}$ alkyl substituted cyclic aliphatic amine, a heterocycle, a $C_1$-$C_{10}$ alkyl substituted heterocycle including a $C_1$-$C_{10}$ alkyl N-substituted heterocycle;

$R^4$ is Ar, $R^2$ or $C_1$-$C_5$ alkoxy,a cyclic alkyl, a $C_1$-$C_{10}$ alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a $C_1$-$C_{10}$ alkyl substituted cyclic aliphatic amine, a heterocycle, a $C_1$-$C_{10}$

alkyl substituted heterocycle and a $C_1$-$C_{10}$ alkoxy substituted heterocycle including a $C_1$-$C_{10}$ alkyl N-substituted heterocycle;

$R^5$ is C=NH;

$R^6$ is Ar, $R^2$ or $C_1$-$C_5$ alkoxy, a cyclic alkyl, a $C_1$-$C_{10}$ alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a $C_1$-$C_{10}$ alkyl substituted cyclic aliphatic amine, a heterocycle, a $C_1$-$C_{10}$ alkyl substituted heterocycle and a $C_1$-$C_{10}$ alkoxy substituted heterocycle including a $C_1$-$C_{10}$ alkyl N-substituted heterocycle; and,

$R^7$ is Ar, $R^2$ or $C_1$-$C_5$ alkoxy, a cyclic alkyl, a $C_1$-$C_{10}$ alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a $C_1$-$C_{10}$ alkyl substituted cyclic aliphatic amine, a heterocycle, a $C_1$-$C_{10}$ alkyl substituted heterocycle and a $C_1$-$C_{10}$ alkoxy substituted heterocycle including a $C_1$-$C_{10}$ alkyl N-substituted heterocycle; and,

wherein said DNA molecule is taken up by cells in said tissue, said DNA sequence is expressed in said cells and an antibody is generated against said antigen.

**149. (previously presented)** The method of claim 148 wherein said polynucleotide function enhancer is a compound having the formula $Ar-R^1-O-R^2-R^3$.

**150. (previously presented)** The method of claim 148 wherein said DNA molecule is a plasmid.

**151. (previously presented)** The method of claim 148 wherein said antigen is an intracellular pathogen antigen.

**152. (previously presented)** The method of claim 148 wherein said antigen is a viral antigen.

**153. (previously presented)** The method of claim 152 wherein said viral antigen is of a virus selected from the group consisting of: human immunodeficiency virus, HIV; Human T cell

leukemia virus, HTLV; influenza virus; hepatitis A virus; hepatitis B virus; hepatitis C virus; human papilloma virus, HPV; Herpes simplex 1 virus, HSV1; Herpes simplex 2 virus, HSV2; Cytomegalovirus, CMV; Epstein-Barr virus, EBR; rhinovirus; and, coronavirus.

**154. (previously presented)** The method of claim 148 wherein said tissue includes skin and muscle.

**155. (previously presented)** The method of claim 154 wherein said tissue is skin.

**156. (previously presented)** The method of claim 154 wherein said tissue is muscle.

**157. (previously presented)** The method of claim 156 wherein said tissue is skeletal muscle.

**158. (previously presented)** The method of claim 149 wherein said DNA molecule is a plasmid.

**159. (previously presented)** The method of claim 149 wherein said antigen is an intracellular pathogen antigen.

**160. (previously presented)** The method of claim 149 wherein said antigen is a viral antigen.

**161. (previously presented)** The method of claim 160 wherein said viral antigen is of a virus selected from the group consisting of: human immunodeficiency virus, HIV; Human T cell leukemia virus, HTLV; influenza virus; hepatitis A virus; hepatitis B virus; hepatitis C virus; human papilloma virus, HPV; Herpes simplex 1 virus, HSV1; Herpes simplex 2 virus, HSV2; Cytomegalovirus, CMV; Epstein-Barr virus, EBR; rhinovirus; and, coronavirus.

**162. (previously presented)** The method of claim 149 wherein said tissue includes skin and muscle.

**163. (previously presented)** The method of claim 162 wherein said tissue is skin.

**164. (previously presented)** The method of claim 162 wherein said tissue is muscle.

**165. (previously presented)** The method of claim 164 wherein said tissue is skeletal muscle.